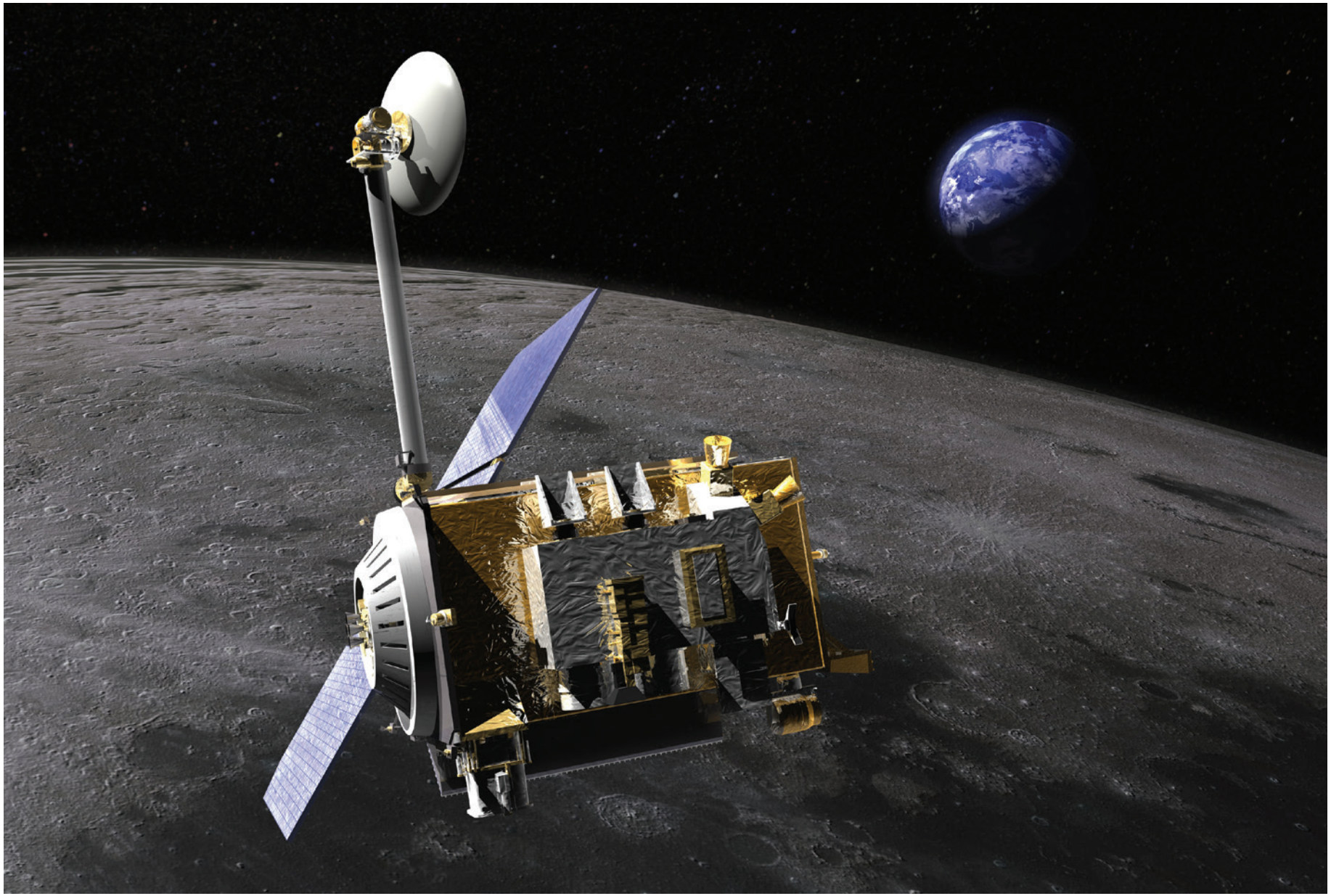
National Aeronautics and Space Administration



LUNAR RECONNAISSANCE ORBITER: Mapping the Moon for future generations

www.nasa.gov

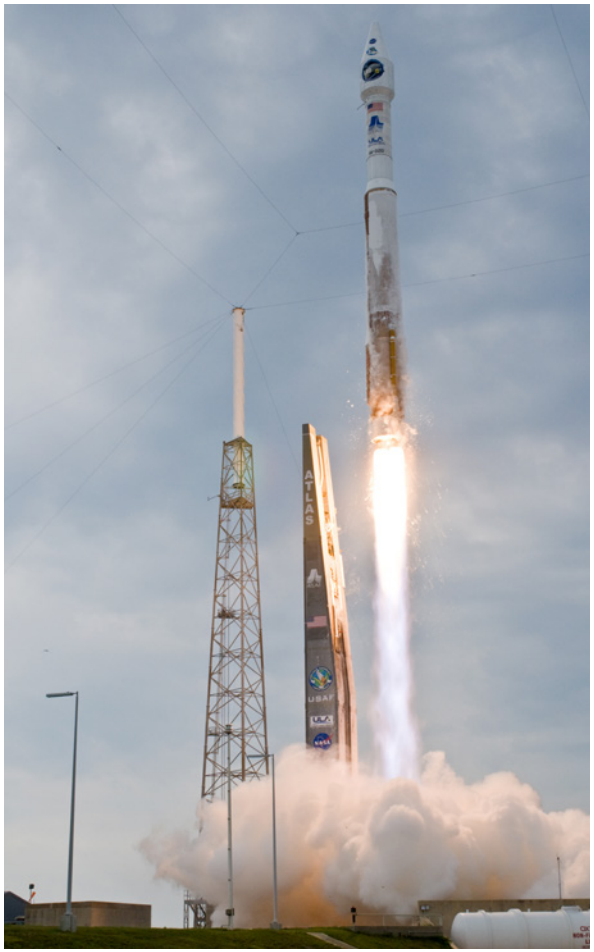
LRO—Lunar Reconnaissance Orbiter

http://nasa.gov/lro

New Understanding of the Moon

As our nearest neighbor, the Moon is a natural laboratory for investigating fundamental questions about the origin and evolution of the Earth and the solar system. With the Lunar Reconnaissance Orbiter (LRO), NASA has returned to the Moon, enabling new discoveries and bringing the Moon back into the public eye.

LRO is a robotic mission that set out to map the Moon's surface and, after a year of exploration, was extended with a unique set of science objectives. While in orbit, LRO has made numerous groundbreaking discoveries, creating a new picture of the Moon as a dynamic and complex body. These developments challenge and improve our understanding of processes throughout the solar system.



Mission Profile

LRO and the Lunar CRater Observation and Sensing Satellite (LCROSS) were launched on an Atlas V rocket on June 18, 2009, beginning a four-day trip to the Moon. LRO spent its first three years in a low polar orbit collecting detailed information about the Moon and its environment. After this initial orbit, LRO transitioned to a stable elliptical orbit, passing low over the lunar south pole.

With a suite of seven powerful instruments, LRO has collected a treasure trove of data, making an invaluable contribution to our knowledge about the Moon.

Objectives and Discoveries

Distribution of Polar Ice

LRO collected evidence indicating that the Moon's polar regions are cold enough to retain water ice, especially in permanently shadowed regions (PSRs). LRO discovered subsurface hydrogen deposits in both sunlit regions and PSRs, as well as measuring the composition of gases released from the Cabeus PSR by the LCROSS impact.

Geological Dynamics and Diversity

LRO discovered a global population of young extensional and contractional landforms, which suggest that the Moon has undergone relatively recent geological activity. LRO observed volcanic complexes formed by viscous lava, extending the history of volcanism on the Moon, and found that the lunar crust is more compositionally complex than previously recognized.

Traces of Previous Explorers

LRO has imaged the effects of human and robotic activity on the lunar surface, including the landing/impact sites of Ranger, Surveyor, Apollo, and the Soviet Luna missions. These images provide a baseline for the analysis of space weathering and contextualize the collection sites of lunar samples. The high-resolution images of the Apollo landing sites are an inspiring record of lunar exploration.

Space Environment Interaction

LRO measured galactic cosmic ray interactions with the Moon during a period of high radiation intensity, enabling the estimation of the radiation dose to the lunar surface over its lifetime. LRO also created a proton albedo map of the Moon and, for the first time, remotely detected the lunar helium atmosphere.

Bombardment History

LRO data has been used to investigate the bombardment history of the Moon, improving the age dating of landforms through high-resolution images of topographic features. By assessing the relative ages of impact basins, scientists created a chronology of lunar impacts, developing our understanding of the ancient impactors that affected the inner planets of the solar system.

More Information
http://nasa.gov/lro
https://www.facebook.com/LunarReconnaissanceOrbiter
Twitter: @LRO_NASA

Goddard Space Flight Center manages the Lunar Reconnaissance Orbiter for NASA's Science Mission Directorate.

Image credit info:

An artist's concept of the Lunar Reconnaissance Orbiter in orbit around the Moon.
Credit NASA/GSFC/Chris Meaney

Trailing a column of fire, the Atlas V/Centaur carrying LRO and LCROSS races above the lightning tower at Cape Canaveral Air Force Station in Florida.
Credit NASA/Sandra Joseph, Tony Gray

LG-2013-X-XXX-GSFC